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# Assimilation processes in service satisfaction formation

Assimilation  
processes

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## Introduction

Satisfied customers are likely to continue their relationship with the firm, and they are less costly to approach than new customers. They are inclined to purchase more, and they help to acquire new customers through positive word-of-mouth (Reichheld and Sasser, 1990). Customer satisfaction has a significant impact on profitability; it is central to assessing the past performance of firms, and to predicting their future financial success (Anderson and Fornell, 1994). To allow effective measurement and management of customer satisfaction, insight into the processes underlying the formation of satisfaction or dissatisfaction by customers is vital. The formation of satisfaction, in particular with services, is focused on here.

The dominant paradigm of satisfaction/dissatisfaction formation is the expectation-disconfirmation model. It specifies that consumer satisfaction/dissatisfaction (CS/D) results from a comparison of expectations concerning the quality of consumption, with the actual consumption experiences (Oliver, 1980). The basic model assumes that expectations and experiences are independent constructs that do not mutually influence each other. Expectations are used as a standard of comparison for the experiences, but expectations are not assumed to have a direct impact on the experiences. Since the development of the expectation-disconfirmation model, research has shown that expectations may sometimes impact directly on experiences, such that higher expectations lead to higher experiences, and lower expectations to lower experiences (for an overview see Yi, 1991). In addition, recent research suggests that customers may not be able to recall their prior expectations in an unbiased way, once they have experienced a good or a service (e.g. Pieters and Zwick, 1993). Both of these findings are illustrations of assimilation effects, as experiences are assimilated in the direction of prior expectations, and recalled expectations are assimilated in the direction of experiences. When assimilation effects occur, expectations and experiences are dependent constructs, as they mutually influence each other.

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Assimilation processes have an important impact on the formation of service satisfaction, because they reduce the size of the disconfirmation of (actual and recalled) expectations by experiences, which may have several effects on the resulting CS/D. First, when expectation-disconfirmation is reduced, it is more likely that CS/D will be driven dominantly by experiences (Cronin and Taylor, 1992), with more positive experiences leading to more satisfaction, and more negative experiences leading to more dissatisfaction. Second, when expectation-disconfirmation is reduced the resulting CS/D is likely to become less extreme, leading to less extreme satisfaction in the case of positive disconfirmation, and less extreme dissatisfaction in the case of negative disconfirmation.

Although research has often found assimilation effects to occur, and although assimilation effects may have substantial effects in the satisfaction process, few attempts have been made to develop models in which assimilation effects are explicitly incorporated. Grönroos (1993) has recently called for the development of dynamic models of service quality and related constructs such as satisfaction, in which assimilation effects are explicitly taken into account. The main goal of this study is to develop and test such a dynamic model of service satisfaction formation.

In the next sections, we first examine two types of assimilation processes in CS/D in detail, and the underlying mechanisms that give rise to the processes. Next, a conceptual model of satisfaction formation is proposed, in which the two processes are incorporated. Then, the model is tested in two empirical studies.

### **Forward assimilation**

Expectations may influence CS/D in two main ways. First, expectations may influence CS/D by acting as a comparison standard for experiences. If expectations act as a comparison standard in the formation of CS/D, their impact is direct and negative, since for a certain level of experiences, customers with high expectations will be less satisfied than customers with low expectations (Oliver, 1980). Second, expectations may influence CS/D by affecting the level of experiences of customers. In this case, their impact on CS/D is indirect and positive, since the higher the expectations are, the higher the experiences will be. The latter influence of expectations is an example of assimilation.

Assimilation theory (Hovland *et al.*, 1957), as originally suggested, specifies that people dislike to experience discrepancies from their previously held positions or opinions, and therefore assimilate their interpretations of events, and their experiences in the direction of their previous positions. When experiences of a service are impacted by customers' prior expectations[1] such that higher expectations lead to higher experiences, and lower expectations lead to lower experiences, forward assimilation (Pieters and Zwick, 1993) occurs. If forward assimilation occurs, the impact of expectations on CS/D is

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indirect, running through experiences, and positive. Two key mechanisms responsible for forward assimilation are now described.

Assimilation  
processes

*Confirmation: when expectations drive experience*

Predictive expectations that customers have about their future experiences with a service, are actually hypotheses about what will happen to them. Consumers as naive scientists engage in activities to test, and particularly to confirm their hypotheses (Deighton, 1984). The need to have accurate knowledge about one's self and one's abilities, is often in conflict with the need to have a positive self-conception and the need for consistency (Fiske and Taylor, 1991). Motivations to feel good about oneself and to be consistent may lead to processes of confirmation. If such processes occur, people see more confirmatory evidence than actually exists. They attend to confirmatory information more, they encode it preferentially, and they interpret outcome information in a manner consistent with their expectations (Swann *et al.*, 1987).

The confirmatory impact of prior expectations may be particularly strong when the actual consumption experiences are ambiguous. For instance, Hoch and Ha (1986) found that consumers tend to rely on the consumption experience itself, a data-driven process, when the experience is unambiguous. They also found that consumers tend to rely on prior hypotheses based on advertising, a hypothesis-testing process, when the experience is ambiguous. Similarly, Deighton and Schindler (1988) observed that subjects, who were exposed to advertising claiming that the music of a particular radio station was new, rated the "newness" of the station's music higher than those of other stations. Individual differences in the level of expectations across situations may have a confirmatory effect as well. For instance, Norem and Cantor (1986) found that subjects with chronically low expectations perceived their performance to be lower than subjects with chronically high expectations, although the two groups did not differ in their actual performance.

Due to their intangibility and heterogeneity, service encounters often provide customers with only a few objective and clear cues to base their quality and satisfaction judgements on (e.g., Parasuraman *et al.*, 1985). For example, how does one determine the quality of management advice? When services are high in credence attributes, or when the service experiences are ambiguous, confirmation of expectations may have a substantial impact on the experiences of the service.

*Adaptation: when expectations drive behaviour*

In a confirmation process, consumers attend to and perceive information about the outcomes of an event in a manner that is consistent with their prior expectations. In an adaptation process, consumers actually change outcomes of events by adapting their own behaviour and/or the circumstances in order to produce expected outcomes (Jones, 1977). As predictive expectations about the quality of service encounters are prophecies, adaptation produces self-fulfilling prophecies (Darley and Fazio, 1980). A classic self-fulfilling prophecy was

examined by Rosenthal and Jacobson (1968) in the context of teachers' expectations about student performance. Teachers were told that certain students, actually chosen at random, were late bloomers who would excel if given the proper attention. A few months later, compared to their peers, the target students performed better on objective tests of academic performance, and they scored higher on IQ tests. Unknowingly, teachers tended to create a warmer social climate for the target students, they gave them more and better feedback about their performance, they tried to teach them more and more difficult material, and they gave them greater opportunity for responding. All these factors contributed to improved learning of the target students.

Self-fulfilling prophecies can refer to the behaviour of others, such as the students in the Rosenthal and Jacobson (1968) study, and they can refer to one's own behaviour. Research has found that subjects with high expectations regarding future success on tasks outperform those with low expectations. One mechanism underlying this result is adaptation; high expectations about performance leads to higher motivation and more intense attempts to achieve one's goal (Locke and Latham, 1990).

Adaptation processes are likely to occur in many service encounters, which are characterized by joint production, and by inseparability of production and consumption. Then, both employee and customer are part of the production process, and expectations that a customer holds about the service level that will be delivered, may produce customer behaviour towards the provider that is consistent with the expectations. This, in its turn, may lead to behaviour by the service provider that is consistent with the original customer hypothesis. The hypothesis that a bank clerk will not be empathic, may lead to customer behaviour that is far from friendly to start with, and which may be reciprocated accordingly. Hypotheses that the customer has about service outcomes or experiences may lead to behaviour that actually produces those outcomes and experiences. The same holds for hypotheses that the employee holds concerning the customer's behaviour.

Confirmation and adaptation processes may occur jointly, as changes in actual behaviour may be accompanied by distortions of interpretation (Fiske and Taylor, 1991, p. 545). When such confirmation and adaptation processes occur, expectations will deviate less from experiences than in the absence of such processes, and the resulting satisfaction or dissatisfaction of customers will be less extreme. The result is a forward assimilation effect, from expectations to experiences. Although in theory, forward contrast effects may occur as well, such that higher expectations lead to lower experiences, and lower expectations lead to higher experiences, many studies have failed to find such effects (Yi, 1991).

### **Backward assimilation**

Only the expectations that are available at the comparison time, can be compared with experiences in CS/D formation. Implicit in the expectation-disconfirmation model of satisfaction is that people are able to recall their prior

expectations correctly once the outcomes of a service encounter become known. However, there is a large body of knowledge showing that people are often unable to remember their expectations of the outcomes of an event correctly once the outcomes of the event become known (Christensen-Szalanski and Willham, 1991). Because people typically tend to exaggerate in hindsight what they knew in foresight, this effect is known as the "I-knew-it-all-along effect" or the hindsight bias (Fishhoff, 1975). Hindsight bias has been observed in situations with objective and subjective outcomes. For instance, Pieters and Zwick (1993) investigated whether participants of an academic conference would be able to recall, after attending the conference, what they expected before the conference to result from it. Both between-subject and within-subject analyses confirmed that personal experiences during the conference interfered with the ability to recall prior expectations correctly. Moreover, their analyses show that the magnitude of hindsight bias varied with the extent to which consumption experiences were salient when trying to recall prior expectations.

Research so far has focused mainly on establishing the magnitude of hindsight bias, and on determining the conditions that give rise to the bias, or that attenuate or amplify it. Little is known about potential effects of hindsight bias on subsequent customer behaviour. After a meta-analysis of over 100 hindsight bias studies, Christensen-Szalanski and Willham (1991) conclude that the overall effect size of hindsight bias tends to be small, and that there is a need to demonstrate that hindsight bias can affect more than just the recall of a person's prior expectations.

Hindsight bias produces a backward assimilation effect (see Pieters and Zwick, 1993) of actual service experiences on recalled expectations. However, a backward assimilation effect on CS/D only occurs if these recalled expectations are used as the comparison standard, instead of, or in addition to, prior expectations in CS/D formation, or if the recalled expectations influence CS/D directly. Grönroos (1993, p. 56) has recently argued that "the customer's experiences of the service encounter may change the expectations, and the altered expectations are the ones which the experiences should be compared with". However, whether such a backward assimilation occurs, and whether the biased recalled expectations are used as the comparison standard by customers, is not that obvious. It may well be that prior expectations are compared with experiences to form a satisfaction/dissatisfaction judgment, and that once this has taken place, prior expectations leave working memory, as they are no longer needed. When asked to recall their prior expectations in such a situation, subjects will base their recalled expectations at least partly on their experiences, which are still available and salient, a process leading to hindsight bias (Hawkins and Hastie, 1990).

If such a process occurs, recalled expectations are prone to backward assimilation, but they do *not* affect CS/D, as CS/D has already been formed by the prior expectations. Then, recalled expectations are a mere epiphenomenon of CS/D formation, and not a determining factor in it. The issue is:

Whether the satisfaction of consumers is determined by the discrepancy between prior expectations and experiences, by the discrepancy between hindsight expectations and experiences, or both (Pieters and Zwick, 1993).

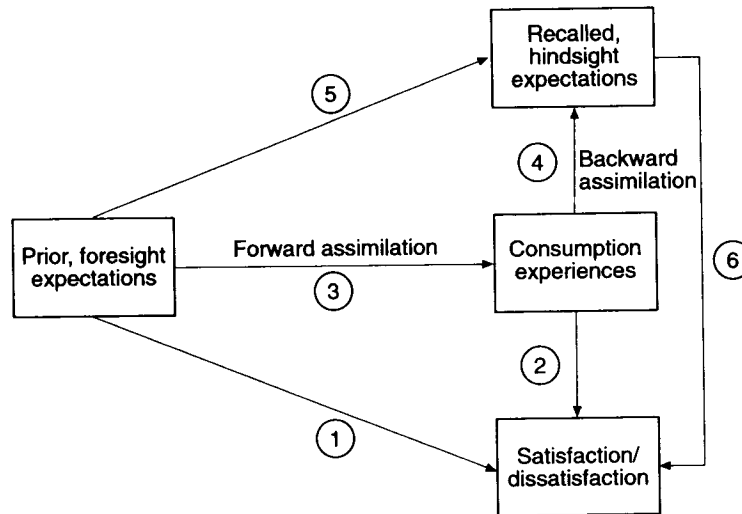
Some recent research has examined the role of backward assimilation in satisfaction formation.

Zwick *et al.* (1994) found, in a study on the evaluation of personalized envelopes, that a systematic hindsight bias occurred for subjects for whom the product of personalized envelopes was self-relevant (they had chosen to receive it, instead of a financial compensation, as a reward for participating in a copy testing study). In addition, their analyses revealed that disconfirmation of expectations as felt by subjects was significantly better accounted for by recalled, biased, expectations than by actual, prior expectations for subjects for whom the product was self-relevant, but not for subjects for whom the product was not self-relevant. Also, compared to prior expectations, recalled expectations predicted CS/D significantly better for subjects who had chosen the product. As in previous research, the magnitude of hindsight bias was not very large, which may partly be due to the brief time period between assessment of the expectations and assessment of the experiences (less than an hour). Despite the brief time lapse, hindsight bias occurred and had a significant impact on CS/D formation.

### **Conceptual model**

So far, the combined impact of forward and backward assimilation on the formation of consumer satisfaction/dissatisfaction has not been studied, as far as we know. It is important to investigate the two processes in combination as the presence of forward assimilation leads to a decreased gap between expectations and experiences, which reduces the likelihood that backward assimilation will occur[2]. So, a reduced backward assimilation effect may, but not necessarily, be due to the presence of forward assimilation. Moreover, in studies on backward assimilation, the duration of the relevant event is often rather short, making the time lapse between assessment of expectations and experiences short as well. One might argue that the longer the duration of the relevant event, and the longer the period between expectation and experience assessment is, the larger the opportunity for backward assimilation is to occur.

The effects that expectations and experiences may have on CS/D formation are indicated in Figure 1. If expectations act as a comparison standard, they have a direct, negative impact on CS/D, indicated by path 1 in the model in Figure 1. An experience effect occurs when experiences have a direct effect on CS/D, path 2. A forward assimilation effect expresses itself as path 3, from expectations to experiences. A backward assimilation effect of experiences on recalled, or hindsight, expectations is indicated by path 4. A memory effect occurs when recalled, hindsight expectations are at least partly based on the prior, or foresight, expectations, path 5. Finally, when recalled or hindsight expectations are backward assimilated in the direction of the experiences, and when they act as a comparison standard instead of or (partly) next to prior or



**Figure 1.**  
Forward and backward  
assimilation in service  
satisfaction formation

foresight expectations, an indirect backward assimilation effect on CS/D occurs, indicated by path 6.

In our model of service satisfaction formation prior expectations may affect CS/D in one direct (path 1) and four indirect ways (paths 3 to 6), while experiences may affect CS/D in one direct (path 2) and three indirect ways (paths 2, 4 and 6). Note that we do not claim that all of these paths occur, and that they occur in all situations for all customers. This is, in fact, open to empirical investigation. In the sequel, we will present the results of two studies in which our model was tested.

The first study is a reanalysis of data presented by Schul (1992) from the perspective of our conceptual model. Schul conducted two elegant studies concerning students' satisfaction with their performance on academic tests. Although his research is on satisfaction with one's own performance and not on CS/D with services, it is interesting for several reasons: the research is among the few in which data purporting both to forward and backward assimilation have been collected; the results of his two studies diverge; and he provides the correlation matrices on which his analyses are based. The second study examines service satisfaction formation in an extended service encounter.

### **Satisfaction with personal performance: a reanalysis**

In two studies, Schul (1992) investigated the effect of expectations on students' satisfaction with their performance in academic tests when feedback about their objective performance was not provided. Overall, his hypotheses are in line with the conceptual model presented previously, with two main differences. First, a direct effect of prior expectations on satisfaction was not examined, as in his model prior expectations only affect satisfaction through their impact on recalled expectations. Second, in his model, recalled expectations are a function



of *objective* performance and prior expectations, instead of a function of *experiences* and prior expectations. This is an important point, since subjects in his research did not receive feedback about their objective performance, so objective performance cannot possibly influence recalled expectations. Moreover, it seems more likely that in general recalled expectations are influenced by the subjects' experiences and not by their objective performance.

In study 1, concerning satisfaction with one's performance on cognitive tasks, path analyses indicated that experienced performance was a joint function of objective performance and prior expectations, an illustration of forward assimilation. In addition, recalled expectations of subjects were a joint function of prior expectations and objective performance. However, satisfaction was a function of experienced performance only, as the effect of recalled expectations was insignificant. In study 2, on satisfaction with one's performance on a final examination of an academic course, a forward assimilation effect on experienced performance was found, but the possibility of a backward assimilation effect on recalled expectations was not explored, as recalled expectations were only modelled as a function of prior expectations. In study 2, recalled expectations did show a significant effect on satisfaction in path analyses.

Schul's results warrant further inspection. Although results in study 1 suggest a backward assimilation effect, an explicit test is not provided. Also, the possibility of a backward assimilation effect was not examined in study 2. Furthermore, only the impact of recalled expectations, and not that of prior expectations or of both, on satisfaction was investigated.

We reanalysed Schul's data using the correlation matrices provided in the original paper, using LISREL 8 (Jöreskog and Sörbom, 1993). The results of the analyses are presented in Table I. Numbers in the column labelled "Path" refer to the path numbers in Figure 1, and terminology is as used in the present article. First, the final path models of Schul were fitted to explore whether his main findings could be recovered. Since Schul (1992) assumed that the error terms of experiences and recalled expectations were correlated both in study 1 and in study 2, we fitted the models accordingly. The results are presented in Table I in the columns labelled "Model 1". Next, an alternative model was fitted in which we: dropped the path from objective performance to recalled expectations in study 1 (objective performance was not measured in study 2); examined the path from experienced performance to recalled expectations; and dropped the correlated errors between experienced performance and recalled expectations. The results are presented in Table I in the columns labelled "Model 2". If model 2 performs equally well or better than model 1, this confirms our hypothesis that backward assimilation took place, and that it was driven by experienced performance. Building on model 2, a second alternative model was fitted, in which: the path between recalled expectations and satisfaction was dropped; and the path between prior expectations and satisfaction was added. The results are presented in Table I in the columns labelled "Model 3". If model 3 fits equally well or better than model 2, this

Path	Study 1			Study 2			Assimilation processes
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3	
1: Foresight – satisfaction	–	–	0.06 ns–	–	–	0.33**	<b>25</b>
2: Experience – satisfaction	0.65**	0.65**	0.60**	0.89**	0.89**	0.88**	
3: Foresight – experience	0.36**	0.36**	0.36**	0.56**	0.56**	0.56**	
4: Experience – hindsight	–	0.36**	0.36**	–	0.14*	0.14*	
5: Foresight – hindsight	0.55**	0.42**	0.42**	0.86**	0.78**	0.78**	
6: Hindsight – satisfaction	–0.06 ns	–0.06 na	–	–0.35**	–0.35**	–	
∴ Foresight – objective	0.06 ns	0.06 ns	0.06 ns	–	–	–	
∴ Objective – experience	0.56**	0.56**	0.56**	–	–	–	
∴ Objective – hindsight	0.20*	–	–	–	–	–	
$\chi^2$ (df)	1.78 (2)	1.78 (3)	1.74 (3)	1.11 (1)	1.11 (1)	1.98 (1)	
	ns	ns	ns	ns	ns	ns	
GFI	0.993	0.993	0.993	0.993	0.993	0.987	
AGFI	0.947	0.964	0.965	0.927	0.927	0.871	

Notes:

Standardized solutions are presented. Asterisks denote significance of path weights.

\*  $p < 0.05$

\*\*  $p < 0.01$

Foresight = prior or foresight expectations. Hindsight = recalled or hindsight expectations.

Source: Schul (1992)

**Table I.**

Reanalysis of  
assimilation effects on  
satisfaction with  
personal performance

**Table I.**  
Reanalysis of  
assimilation effects on  
satisfaction with  
personal performance

suggests that prior expectations have a direct impact on satisfaction, in addition to or instead of their indirect impact through recalled expectations.

Fitting model 1 produces results that are very similar to those presented by Schul; chi-squares are respectively 1.79 (df = 2), for study 1, and 1.11 (df = 1), for study 2, in our reanalysis, and respectively 1.54 (df = 2), for study 1, and 3.23 (df = 1), for study 2, in the original analyses. All significant path weights in the original study remain significant, and all insignificant path weights remain insignificant. Also, the sizes of the path weights in our reanalysis are close to those in the original study. Correlated errors were estimated to be 0.32 and 0.23 in the original analyses of studies 1 and 2 respectively (see footnotes 3 and 5 in Schul, 1992), and 0.33 and 0.10 in the present reanalysis. Slight deviations in the results are due to the fact that Schul (see Schul, footnote 3) included an additional variable in the analysis that was not included in his correlation matrices, and therefore cannot be modelled by us. However, the overall correspondence between results is very high.

The reanalysis of study 1 reveals a strong, significant backward assimilation effect of experienced performance on recalled expectations, as indicated in model 2. We prefer model 2 over the original model 1 by Schul (1992), because it has a good fit, is more parsimonious, with an extra degree of freedom (due to

dropping the correlated errors), and because it is in agreement with the theoretical analysis presented above. The results of model 3 show that exchanging the path from recalled expectations to satisfaction, for the path from prior expectations to satisfaction does not change the main performance of the model, although the chi-square, relevant path weight, and fit indices for model 2 are slightly better.

The reanalysis of study 2 reveals again a significant forward assimilation effect on experienced performance, and a significant, but smaller, backward assimilation effect of experienced performance on recalled expectations. Comparing model 2 with model 3 reveals that one cannot easily determine whether recalled expectations affect satisfaction, or whether prior expectations affect satisfaction, as both path weights are statistically significant (if the other path is not included in the model). If both prior and recalled expectations are included (leading to a saturated model with 0 degrees of freedom), both path weights are significant. As the fit indices, chi-square and the size of the relevant path weight for model 2 are slightly better than those for model 3, there is a slight preference for model 2.

Summarizing, Schul (1992) found a significant forward assimilation effect on experienced performance, and a strong experience effect on CS/D in both of his studies. Our reanalysis of his data confirmed these findings, and in addition revealed a backward assimilation effect of perceived performance on recalled expectations, in both of his studies. Also, our reanalysis revealed that in study 2 expectations do act as a comparison standard, but that, on the basis of the available information, one cannot indicate whether prior or recalled expectations or both act as the comparison standard.

Schul (1992) investigated satisfaction with one's own performance on academic tests, measuring expectations and experiences in close temporal proximity. Hence, the results can not easily be generalized to situations in which services or service providers are evaluated, and in which the time interval between expectations and experiences is substantial. An empirical study was designed to explore the effect of forward and backward assimilation on CS/D formation in an extended service encounter.

## **Satisfaction formation in an extended service encounter**

### *Design*

Data were collected in a two-wave panel study, conducted in the context of a 14-week undergraduate course on marketing communications at Erasmus University in The Netherlands. Students majored in economics and communication. During the course, students and professor met once a week, for two 45-minute classes. The course lasted until the last-but-one class, in which exam training was given. Data were collected by a research assistant, directly before the start of the first meeting of the course, and before the students had met the professor, in the room where the class was taught (wave 1), and right before the start of the final meeting of the course (wave 2), in the teaching room. In the first wave, data about prior expectations were collected. In the second

wave, data about experiences, recalled expectations, and satisfaction/dissatisfaction were collected. All students present during the first meeting, wave 1, and during the last meeting, wave 2, participated in the study. A total of 116 students participated in the first wave, and 113 in the second wave, 14 weeks later. In all, 176 students participated in at least one wave, and 53 students participated in both waves. Model tests are based on the 48 students for whom complete data for both waves are available. Additional analyses will be performed on the other available data as well.

### *Measures*

Prior expectations were measured in two different ways. First, a six-item attribute-specific measure of prior expectations was included, with items worded as follows: "this course will be very useful for me", "the quality of the course will be high", "topics will be treated superficially", "the professor will be very capable", "the professor will be very motivated", and "the consecutive classes will lack connection". Next, a three-item global measure of prior expectations was included, with items worded as follows: "after the course has ended I will be very satisfied about it", "this course will leave me with positive feelings towards it", and "I will be very disappointed after finishing the course". All items were followed by seven-point response scales ranging from "very unlikely" (1) to "very likely" (7), with a mid-point "neither unlikely nor likely" (4). Items formulated negatively were recoded before analysis. Measures of recalled expectations were similar to the measures of prior expectations. Respondents were instructed to recall what their expectations were before the course started.

Experiences of the course were measured on six items representing the same attributes as in the prior expectations. Response alternatives ranged from "completely disagree" (1) to "completely agree" (7). Satisfaction/dissatisfaction was measured in two different ways again. An attribute-specific measure of CS/D included the same six items as the attribute-specific prior expectation measure, but now items were followed by "very dissatisfied" (1) to "very satisfied" (7). A global measure of CS/D included the same three items as in the global prior expectation measure, with responses ranging from "completely disagree" (1) to "completely agree" (7). Finally, subjects were asked to indicate how many meetings of the course they had attended. Responses ranged from "only one meeting" (1), to "all meetings" (7), with a mid-point "half of the meetings" (4).

### **Results**

Internal consistency of the scales was assessed with coefficient alpha. Alphas were respectively 0.59 for the six-item attribute-specific measure of prior expectations, 0.76 for the global measure of prior expectations, 0.65 for the six-item measure of experiences, 0.66 for the six-item attribute-specific recalled expectations scale, 0.75 for the three-item global recalled expectations measure, 0.72 for the attribute-specific and 0.88 for the global satisfaction measures.

*Drop-outs and late-entries*

It is likely that students dropping out of the course, evidenced by their absence in the last meeting/wave, differ from students remaining on the course. According to the basic expectation-disconfirmation model, once customers are engaged in a service encounter, those with low expectations will be more satisfied than those with high expectations. However, before actually engaging in the service encounter, customers with low expectations will be less likely to engage in it than customers with high expectations. The higher one's expectations are, the more likely one is to decide for a particular service. As the first meeting in a course mirrors a product sampling situation, where students decide to engage in the service or not, we expect that students with high prior expectations will be more likely to remain on the course than students with low expectations. Additionally, if forward assimilation occurs, high expectations lead to high experiences, which increases the likelihood of remaining in the course. It was confirmed by *t*-tests that remaining students had higher prior expectations than drop-outs (5.50 vs 5.11;  $t = 2.74$ ,  $df = 111$ ,  $p = 0.007$ , for the attribute-specific measure; 5.57 vs 5.28;  $t = 1.78$ ,  $df = 112$ ,  $p = 0.008$ , for the global measure).

There is no reason to expect that students who entered the course later, as evidenced by their absence in the first meeting/wave, differ from the students who participated in the course throughout. Comparative *t*-tests in which late-entries were compared with regular students on their recalled expectations, experiences and satisfaction/dissatisfaction did not reveal any significant differences. Late-entries only attended the meetings less often than regular students did (respective means on the attendance measure were 5.13 for late-entries and 5.73 for regular students,  $t$ -value =  $-2.57$ ,  $df = 104$ ,  $p = 0.01$ ).

*Aggregate model testing*

The conceptual model was tested in an overall fashion using path analysis. The analyses were performed separately for the attribute-specific and the global measures on the appropriate variance-covariance matrices, using LISREL 8[3]. First, a model was tested including paths 2 to 6 of the conceptual model presented in Figure 1. Next, a model was tested including paths 1 to 5. The results are presented in Table II.

The analyses indicate that forward assimilation effects occur in CS/D formation with respect to the marketing course under study. The exact flow of the forward assimilation effect differs between types of measures. A forward assimilation effect of global expectations on experiences is found, and a (direct) forward assimilation effect of attribute-specific measures on satisfaction is found. The direct effect of prior expectations on satisfaction is an assimilation effect and not a comparison effect, as the sign of the parameter is positive (a comparison effect would lead to a negative sign). Both for attribute-specific and

Path	AS		Global satisfaction		Assimilation processes
	Model 1	Model 2	Model 1	Model 2	
1: Foresight – satisfaction	–	0.24***	–	0.11 ns	<b>29</b>
2: Experience – satisfaction	0.67***	0.66***	0.71***	0.73***	
3: Foresight – experience	0.14 ns	0.14 ns	0.36***	0.36***	
4: Experience – hindsight	0.24**	0.26**	0.24*	0.24*	
5: Foresight – hindsight	0.40***	0.40***	0.36***	0.36***	
6: Hindsight – satisfaction	0.08 ns	–	0.17*	–	
$\chi^2$ (df)	5.01 (1)**	0.08 (1)	0.29 (1)	2.04 (1)**	
GFI	0.952	0.999	0.997	0.980	
AGFI	0.519	0.993	0.971	0.801	
Notes:					
AS = Attribute-specific. Standardized solutions are presented					
* $p < 0.10$					
** $p < 0.05$					
*** $p < 0.01$					
Foresight = prior or foresight expectations. Hindsight = recalled or hindsight expectations					

**Table II.**  
Forward and backward  
assimilation in service  
satisfaction formation,  
attribute-specific and  
global

for global measures, backward assimilation effects on recalled expectations are found, as evidenced by the significant path weights from experience to recalled expectations. As in prior research, the size of the backward assimilation effect is rather small, and only approaches significance for the global measures. Both for attribute-specific and for global measures, the experience effect is dominant.

Finally, the two prior expectation measures, the two recalled expectation measures, and the two satisfaction measures were combined into new measures of the respective constructs, to provide an overall analysis. Both model 1 and model 2 as indicated in Table II were fitted to the averaged data. Although chi-squares for both models were not significant, and the size of fit indices was satisfactory (model 1:  $\chi^2_1 = 1.06$ , GFI = 0.989, AGFI = 0.889, model 2:  $\chi^2_1 = 1.95$ , GFI = 0.980, AGFI = 0.800), path 6, from recalled expectations to satisfaction, in model 1 was significant (unstandardized path weight 0.23,  $t = 2.01$ ), while path 1, from prior to satisfaction, in model 2 only approached significance (unstandardized path weight 0.184,  $t = 1.75$ ), leading to a slight preference for model 1.

### Conclusions and implications

Several conclusions can be drawn from our conceptual and statistical analyses. Again we find that the direct impact of experience is much larger than is sometimes acknowledged. Yi (1991) mentions that many researchers have focused on expectations and disconfirmation as key variables and have ignored product performance or service experiences. Although the expectation-

disconfirmation model is an elegant framework, it may assume a customer that is both motivated and able to form prior expectations, and who is motivated and able to compare these with subsequent experiences. Oliver and DeSarbo (1988) found that the most dominant process in CS/D formation was based on experiences and disconfirmation. Others have found similar results (e.g. Churchill and Suprenant, 1982; Oliver and Bearden, 1983). Our results lead to a similar conclusion. It is not unlikely that future field research will show that more often than not, experiences, instead of expectations dominate satisfaction formation, in particular with respect to services.

The previous conclusion does not preclude the importance of expectations in service satisfaction formation. Our results underline the relevance of forward assimilation, in particular in the case of service satisfaction formation. Both in the reanalysis of Schul's (1992) data and in the additional field study, expectations had a substantial impact on experiences. In addition, our results suggest that prior expectations may have a forward assimilation effect on satisfaction as well, indicated by the sign of the significant correlation between prior expectations and attribute specific CS/D (Table II, model 2), and indirectly by the difference between drop-outs and remainers in the study.

Research on satisfaction formation has been dominated by the disconfirmation of expectation paradigm. In the beginning, researchers focused on the subtraction of expectations and experiences as an "objective" measure of disconfirmation. Later on, disconfirmation was sometimes measured directly, as a subjective measure. Although such a direct measure of disconfirmation tends to provide better predictions of CS/D, models of satisfaction formation process largely remained static. In a way, the basic model treats the customer as a bookkeeper, who compares expectations with experiences, takes their difference, adds differences up to a sum score, and then decides whether this overall difference is good or bad. This customer-as-a-bookkeeper model does not assume that the customer is rational, as s/he may make mistakes or be inefficient. However, such a model does assume that customers have a balance sheet in their heads. This is obviously not the case. We would like to add to the call by Grönroos (1993) for dynamic models of service quality and satisfaction, a call for realistic models. In realistic models, concepts are often less well separated, and less well ordered as on a balance sheet, whether we like it or not. In this study we proposed a dynamic model of the process of service satisfaction formation by customers. Our first results suggest that it is realistic as well. Future research should test its amount of realism further.

The finding that forward assimilation effects occur consistently has important implications for marketing management. If the basic expectation-disconfirmation model would be correct, managers would be advised to lower customer expectations as much as possible, just above the level where customers will decide not to enter the service encounter (lowest possible level (LPL)). In such a case the positive expectation-disconfirmation would be maximized, and the resulting satisfaction would be maximized as well. However, if a significant and strong forward assimilation effect occurs, the

recommendation to managers is reversed. Managers would be advised to raise customer expectations as much as possible, just below the level where customers will feel that the expectations are unrealistic or incredible (highest possible level (HPL)). Through forward assimilation, these increased expectations will lead to increased experiences with the service. In fact, if forward assimilation occurs and managers would, incorrectly, lower expectations, these lowered expectations would produce lower experiences with the service, which seems the last thing most managers are interested in. Of course, one should be careful with the recommendation to increase expectations to the HPL. As yet, it is not clear how high the HPL is, and how variable it is across customer segments, service domains and consumption situations. Also, it remains to be seen under which conditions forward assimilation occurs. It is likely that the forward assimilation effect is significantly stronger for services with many credence attributes, or where the experiences are rather ambiguous (e.g. management advice, education), than for services with many search attributes, and where experiences are rather unambiguous (e.g. fast food restaurants or long distance telephone companies). Perhaps some customer segments, e.g. novices, are more prone to forward assimilation effects than others, e.g., experts. Future research should investigate such and related hypotheses.

Several limitations may apply to the second study. First of all, only a small sample was available for the final model tests. Due to the small sample size a structural equation approach using latent variables could not be used, although the advantages of such an approach are obvious. Future research following such an approach will be better able to uncover and specify the size of the effects of forward and backward assimilation in service satisfaction formation.

The effect of expectations on experiences and satisfaction in the present study can not be attributed unequivocally to a specific process. They may be due to one or more of the specific processes giving rise to forward assimilation[4]. In an effort to obtain realism and external validity, the advantages of laboratory control and manipulation were sacrificed. Although, we cannot determine the precise processes underlying the effect of expectations on experiences, we have shown that expectations affect experiences and satisfaction over a period as long as three months, and we are confident that this effect is not due to demand artifacts, but to the actual processes that are effective in real-life service encounters.

Because a substantial number of customers dropped out of the service encounter, self-selection may have biased the substantive results of our study. The analyses show that in particular customers with low expectations about the quality of the course dropped out. Hence, the final sample on which the path analyses are based comprised students with high prior expectations. The question is what effect this may have had on model estimation and hypothesis testing. The fact that customers who dropped out of the service encounter had lower prior expectations leads to a reduction in the variability of the expectations of the remaining customers. This variability reduction, reduces the



likelihood of finding a significant relationship between expectations, experiences and satisfaction. The fact that, even under such difficult circumstances, we did find a significant relationship in the present study for the global measures, and in the overall analysis, adds to the validity of the present results, and underlines the importance of expectation effects in satisfaction formation. The fact that customers who dropped out of the encounter differ significantly from customers remaining in the encounter does not seem to bias the substantive results of the study, but underlines them.

In conclusion, models of CS/D and related constructs, such as perceived service quality, that focus on the gap between expectations and experiences might gain in realism when the effect of expectations on experiences and satisfaction, and of experiences on recalled expectations and satisfaction is not only acknowledged, but is also modelled explicitly. By ignoring forward assimilation effects, we may underestimate the impact of expectations on final CS/D. By ignoring backward assimilation, we may underestimate the effect of experiences on final CS/D.

#### Notes

1. The dominant meaning of expectations as estimates or probabilities of future events is used (Oliver, 1980).
2. If expectations are close to experiences, there is less objective room for hindsight bias. Moreover, if the discrepancy is small, there may be less reason for it, assuming that the bias is at least partly due to motivational factors (Zwick *et al.*, 1994).
3. The appropriate variance-covariance matrices, and other information can be obtained on request from the authors.
4. Note that all students were exposed to the same service and to the same service level, as provided by the first author (*sic!*), in something that Deighton (1992) would call skill performance. Hence, a positive correlation between expectations and experiences of the customers seems due to forward assimilation and not to correct prediction of (objective outcomes).

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